

**University of Bahrain**  
**College of Information Technology**  
*Department of Computer Engineering*

*Test II*

<b>Student Name</b>	<b>:</b>	
<b>ID No.</b>	<b>:</b>	
<b>Section</b>	<b>:</b>	

**Course Title** : Digital Logic  
**Course No.** : ITCE 202  
**Semester** : Second  
**Academic Year** : 2004-2005  
**Date** : May 23, 2005  
**Time** : 1Hr

Question	Points Attained
1	
2	
3	
4	
5	
Total	

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Show all your work.



**Q1( 20-points)**

Using 4-bit adder (7483) and any necessary logic elements, design a logic circuit that takes a 4-bit signed binary number  $W = W_3 W_2 W_1 W_0$ , and produces its absolute value ( $Z = Z_3 Z_2 Z_1 Z_0$ ).

$$Z = |W|$$

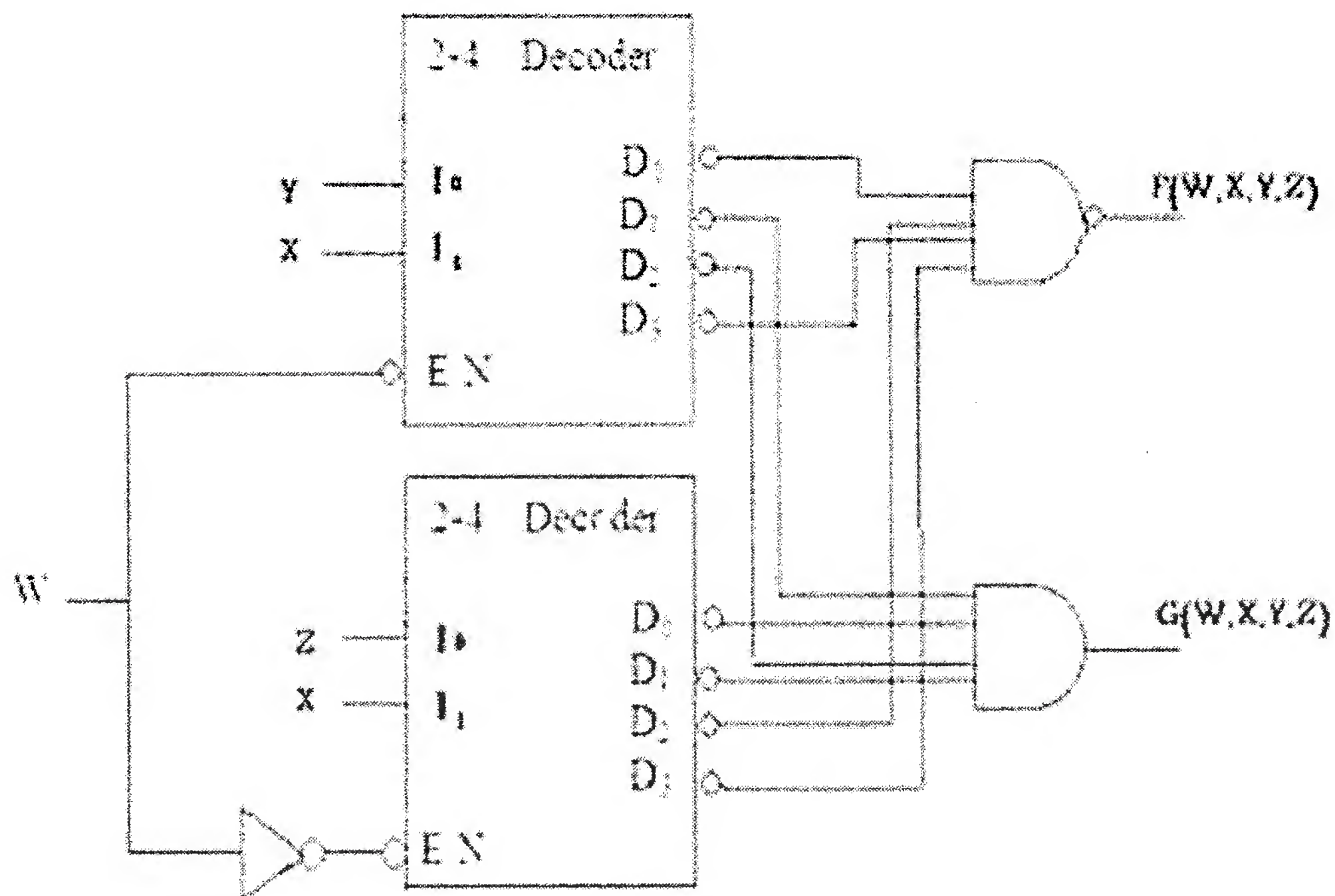
Hint: If  $W$  is positive then  $Z = W$ , else  $Z = -W$ .



**Q2 (20-points)**

For the block diagram below:

Find the truth table for the output functions  $F(W, X, Y, Z)$  and  $G(W, X, Y, Z)$ .



**Q3- (20-points)**

- a- Using **minimum** number of 2-to-1 multiplexers **only**, implement the following function. Assume the complements of the variables are available.

$$F = \sum m(2,5,6,7,8,9,14)$$

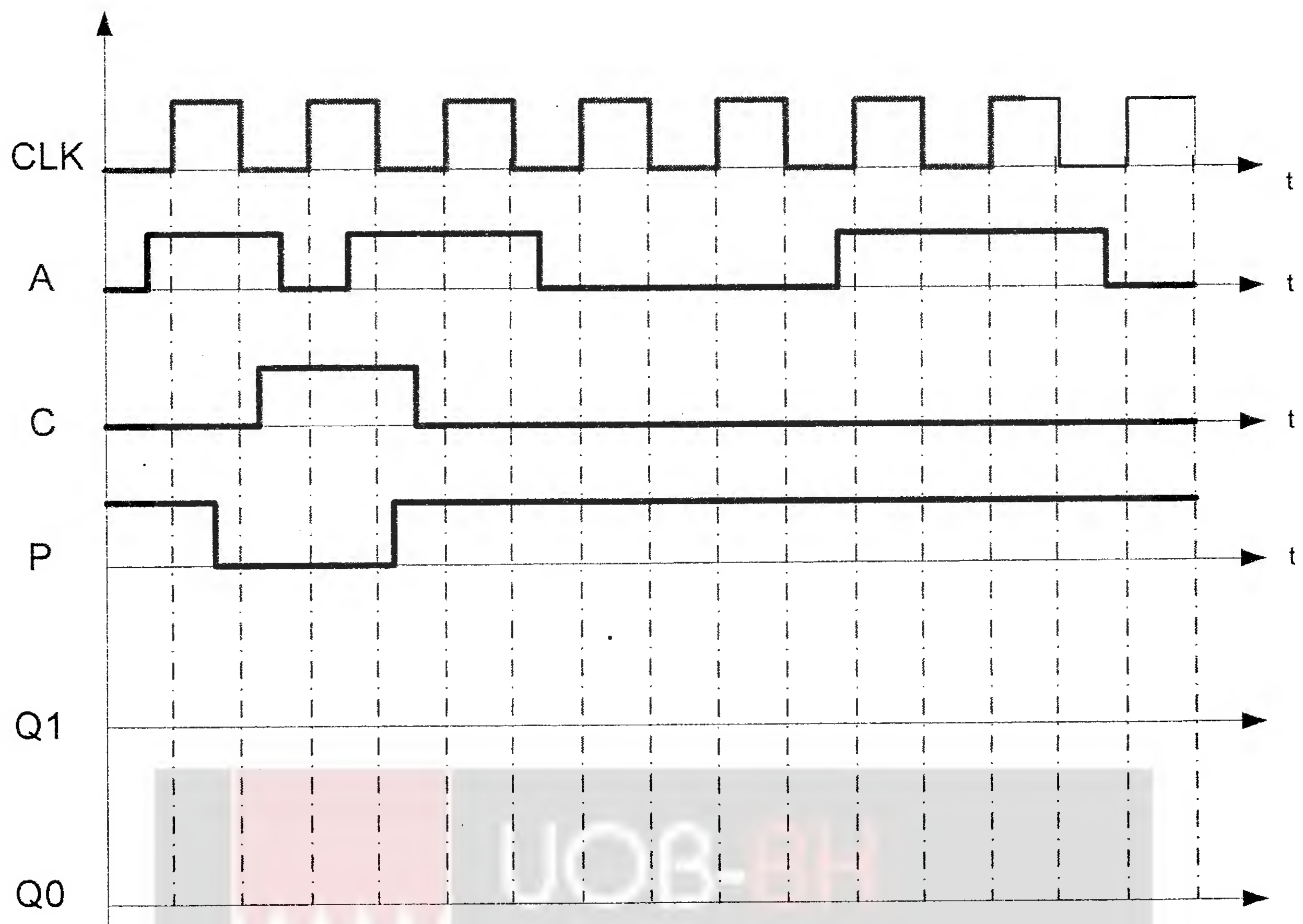
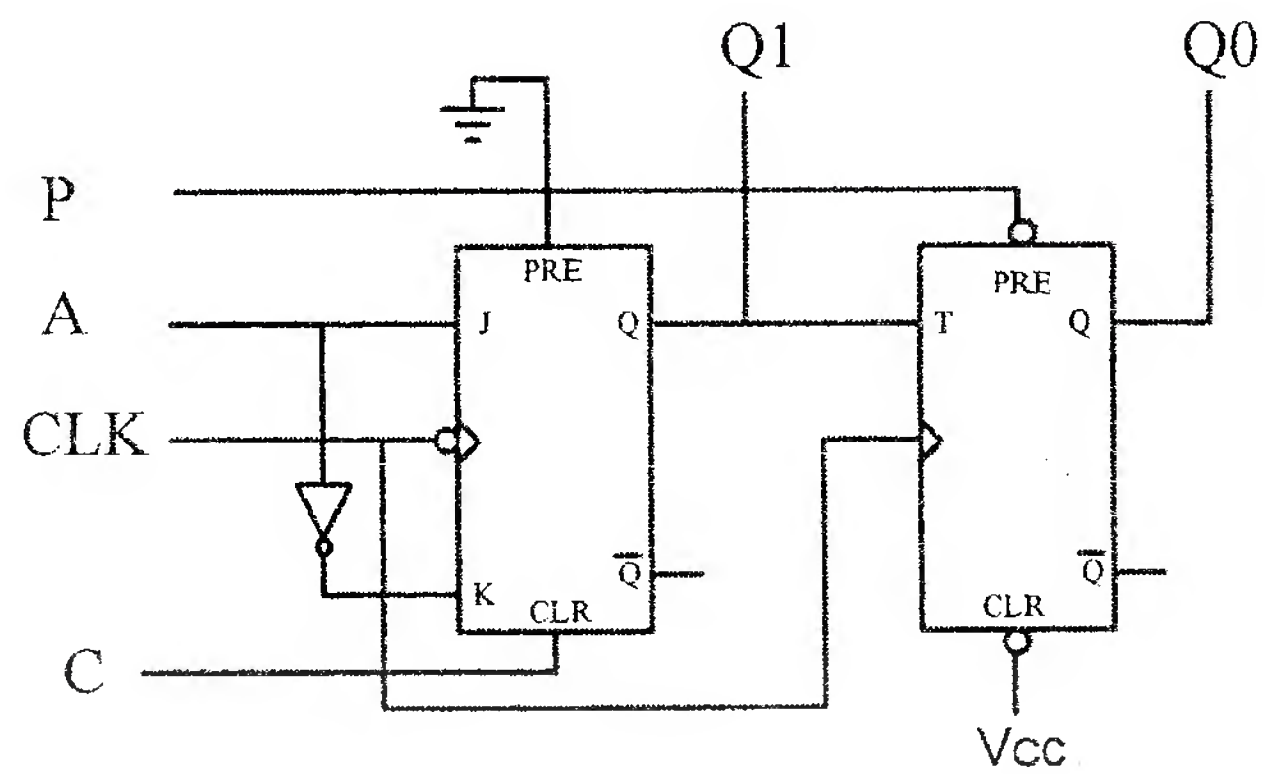
- b- Reimplement the function using a **single** (4-to-1) multiplexer with necessary gates.





**Q4 (20-points)**

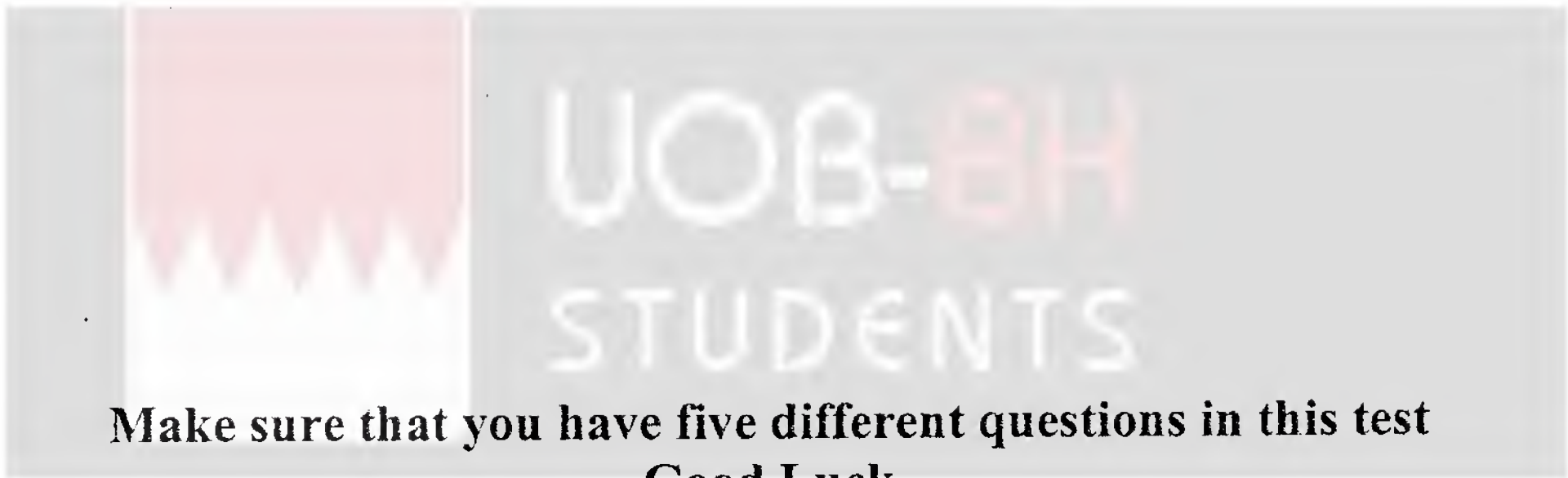
The logic circuit below contains a J-K flip-flop and a T flip flop. Complete the timing diagram by drawing the waveforms of signals  $Q_1$  and  $Q_2$ . Assume that both  $Q_1$  and  $Q_2$ , initially are zeros.



Q-5 (20- points)

The characteristic table of  $P$ - $I$  flip-flop is as shown in the table. Show how you can convert a  $P$ - $I$  flip-flop to a  $T$  flip-flop. Use any necessary gates

$P$	$I$	$Q^+$
0	0	0
0	1	$Q$
1	0	$\overline{Q}$
1	1	1



Make sure that you have five different questions in this test  
Good Luck